

Electronic Components

Part II: Pulses, Waves and Signals

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Introduction

This video will continue the study of electronics. It will use the information provided by the first video to expand the student's knowledge of transistors, diodes and other components. The discovery of the transistor made the old vacuum tubes found in early model radios and televisions obsolete. This program points out the advantages that solid state transistors have over basic triode vacuum tubes. Also, more detailed information will be provided concerning the operation and applications of several types of transistors. Transistor testing procedures will show you the methods used to check the operation of certain transistors. You will also learn how transistors can be used to produce current amplification in a circuit. This video will introduce you to many other electronic devices. You will see how these components are designed and how they function. Computer animation along with actual bench tests will demonstrate how some of these electronic components are used for industrial purposes.

Student Objectives

After viewing this video, the student will be able to:

Explain the many different applications of a transistor.

Describe the basic operation of a transistor.

Test the general condition of a transistor.

Explain the purpose of a transistor "wet finger test",

Describe the basic principles of "amplification".

Compare the differences between an "FET" transistor and a "bipolar transistor",

List three essential parts of an "FET" transistor.

Explain how a "MosFET" transistor works,

Describe some of the applications of a "unijunction" transistor.

Explain how a "zener" diode regulates voltage in a circuit.

To The Instructor

This video is designed to be a valuable supplement to your curriculum. Since young people are extremely acclimated to television, it is a natural way to help present important aspects of your subject matter. This video is designed to give a detailed, yet broad coverage of the topic.

Most educators agree that it is best to use as many instructional methods as possible. Utilise quality textbooks, workbooks, videos, lectures, demonstrations, overheads, and other methods to present the technical information. This will hold interest and help pupils understand the large amount of information required to succeed in today's complex world.

This video is organised into major sections or topics. Each section covers one major segment of the subject. Graphic breaks are given between each section so that you can stop the video for class discussion, demonstrations, to answer questions, or to ask questions. This allows you to only watch a portion of the program each day or to present the complete video, depending on your curriculum requirements.

The video is designed to simplify the complex. Concise wording and carefully selected graphics are used to provide maximum learning in minimum time.

Close-up shots of components and service procedures are used to make every second of viewing instructional, as if each student was standing right behind you, watching over your shoulder while you were working or giving a demonstration.

Computer animation is used to explain difficult to comprehend principles or techniques. These images show how parts work, how they fit together, or how they vary in design.

Quiz Answer Key

1.d 2.b 3.c 4.d 5.b 6.b 7.c 8.d 9.b 10.d 11.c 12.c 13. b 14. c 15. b

Use your own judgement to evaluate the definitions, short answer questions and discussion topics.

Technical Terms

Write definitions for the following terms. Use a textbook or review the video if needed.

triode vacuum tube
small signal transistor
high frequency transistor
power transistor
heat sink
transistor biasing
transistor wet finger test
amplification
field effect transistor
bipolar transistor
field effect transistor gate
field effect transistor source
field effect transistor drain
MOSFET transistor
unijunction transistor
SCR
triac
zener diode

Video Discussion Topics

Here are a few topics that might be used for a class discussion:

1. How would your life be affected if transistors had not replaced triode vacuum tubes?
2. Which type of radio would be easier to service, one equipped with tubes or one equipped with transistors?
3. Had heat sinks not been invented, how would you design a method to transfer heat from large power transistors?
4. How would you explain the process of amplification to someone unfamiliar with electronics?
5. Do you think FET transistors will eventually replace bipolar transistors in future electronic technology?
6. How would you guard against static electricity on your hands and clothing when working with electronic devices?
7. Could an electric car powered by DC batteries use an SCR to control the electric motor operation?
8. If you were an inventor, what invention of yours would use zener diodes?

Video Quiz

Choose the most correct answer after reading the statement:

1. Which of these electronic devices can be used to amplify low strength electrical signals?
a. power transistor b. zener diode c. MOSFET d. small signal transistor
2. _____ transistors are designed to carry heavy current, such as in power supplies or amplifiers.
a. Unijunction b. Power c. MOSFET d. Frequency
3. The _____ is a solid state replacement for the old vacuum tube found in early model radios.
a. diode b. SCR c. transistor d. triac
4. What type of electronic device has a super thin base region for controlling radio, television and microwave frequencies?
a. a triac b. a unijunction transistor c. a high frequency diode d. a high frequency diode
5. The _____ for transistors will normally give performance specifications , and diagrams showing emitter, base and collector connections
a. components b. packaging c. wiring d. mounting
6. Transistor _____ .refers to how voltage is connected to the leads of a transistor .
a. polarization b. biasing c. rectification d. installation
7. Excessively high _____ will make a transistor run hot or overheat and function improperly.
a. dc voltage b. resistance c. current d. voltage
8. What should be done if a transistor is "hot to the touch"?
a. leave it alone b. remove and replace the transistor c. reduce the power supply
d. disconnect power and find the source of trouble
9. The circuitry in a radio modifies and _____ the radio station's signal until it can power the speaker_coil and produce audible sounds.
a. magnifies b. amplifies c. rectifies d. transmits
10. What is an "FET"?
a. field effect transmitter b. forward effect transmitter c. field electronic transmitter d. field effect transistor
11. The gate, source, and drain are wires from a _____.
a. SCR b. zener diode c. FET d. triac
12. Which type of transistor is commonly used in computer- integrated memory circuit chips?
a. bipolar b. power c. MOSFET d. unijunction
13. Some industrial _____ used on the electrical system of a diesel locomotive can_control an astounding 1 000 amps.
a. FETs b. SCRs c. triacs d. MOSFETs
14. A common use for _____ is to control the speed of AC motors.
a. FETs b. MOSFETs c. triacs d. transistors
15. Which of the following electronic devices acts as a voltage release valve?
a. a triac b. a zener diode c. an FET d. an SCR

Short Answer

Briefly answer the following questions in your own words:

1. What advantages do transistors have over triode vacuum tubes?
2. Why are heat sinks often used with large power transistors?
3. Diagram and explain one method used to check the general condition of a power transistor with a digital ohmmeter .
4. Describe how to perform a transistor "wet finger test",
5. Explain why a radio is a good example of the principle of amplification.
6. How does an FET operate?
7. Diagram and explain the basic operation of a MOSFET .
8. Describe a fundamental application of a unijunction transistor in a circuit.
9. How does an SCR function?
10. Why is a zener diode considered ideal when voltage must be regulated in a circuit?

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